

242a Fuzzy Diagnosis Method for Process Systems with Coupled Loops

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By considering the fault propagation behaviors in process systems with coupled feed forward and feedback loops, a fuzzy-logic based fault diagnosis strategy has been developed in the present work. The proposed methods can be implemented in two stages. In the off-line preparation stage, the root causes of a system hazard are identified by determining the minimal cut sets of the corresponding fault tree. The occurrence order of observable disturbances caused by each fault origin is derived from the system digraph. All possible patterns of the on-line symptoms and their evolution sequences can then be deduced accordingly. These sequences are used as the basis for constructing a two-layer fuzzy inference system. In the next on-line implementation stage, the occurrence indices of the the root causes are computed with the IF-THEN rules embedded in the inference engine using the real-time measurement data. Simulation studies have been carried out to demonstrate the feasibility of the proposed approach.